

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A method for radio communication between a first device having N plurality of antennas and a second device having M plurality of antennas, comprising: ~~a step of~~
processing a vector **s** representing L signals [$s_1 \dots s_L$] with a transmit matrix **A** that is computed to maximize capacity of the channel between the first device and the second device subject to a power constraint that the power emitted by each of the N plurality of antennas is less than or equal to a maximum power, ~~whereby the transmit matrix **A** distributes and that weights~~ the L signals [$s_1 \dots s_L$] for simultaneous transmission along the eigenvectors of the channel between among the N plurality of antennas for simultaneous transmission and M plurality of antennas of to the second device.
2. (currently amended) The method of claim 1, wherein the [[step of]] processing comprises processing the vector **s** with the transmit matrix **A** that is computed subject to the power constraint being different for one or more of the N plurality of antennas.
3. (currently amended) The method of claim 1, wherein the [[step of]] processing comprises processing the vector **s** with the transmit matrix **A** that is computed subject to the power constraint being the same for each of the N plurality of antennas.

4. (currently amended) The method of claim 3, wherein the [[step of]] processing comprises processing the vector \mathbf{s} with the transmit matrix \mathbf{A} that is computed subject to the power constraint for each of the N plurality of antennas being equal to a total maximum power emitted by all of the N plurality of antennas combined divided by N .
5. (currently amended) The method of claim 4, wherein the [[step of]] processing comprises multiplying the vector \mathbf{s} with the transmit matrix \mathbf{A} , where the transmit matrix \mathbf{A} is equal to $\mathbf{V}\mathbf{D}$, where \mathbf{V} is the eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, \mathbf{H} is the channel response from the first device to the second device, $\mathbf{D} = \text{diag}(d_1, \dots, d_L)$ and $|d_p|^2$ is the power of the p^{th} one of the L signals.
6. (currently amended) The method of claim 5, wherein when $N \leq M$, the [[step of]] processing comprises multiplying the vector \mathbf{s} with the transmit matrix \mathbf{A} , where $\mathbf{D} = \mathbf{I} \cdot \sqrt{P_{\max}/N}$, and \mathbf{I} is the identity matrix, such that the power transmitted by each of the N plurality of antennas is the same and equal to P_{\max}/N .
7. (currently amended) The method of claim 5, wherein when $N < M$, the [[step of]] processing comprises multiplying the vector \mathbf{s} with the transmit matrix \mathbf{A} , where $\mathbf{D} = \sqrt{d \cdot P_{\max}/N_{\text{Tx}}} \cdot \mathbf{I}$, such that the power transmitted by antenna i for $i = 1$ to N is $(d \cdot P_{\max}/N) \cdot (\mathbf{V}\mathbf{V}^H)_{ii}$, and $d_p = d$ for $p = 1$ to L .
8. (currently amended) The method of claim 7, wherein the [[step of]] processing comprises multiplying the vector \mathbf{s} with the transmit matrix \mathbf{A} , where $d = 1/z$ and $z = \max_i \{(\mathbf{V}\mathbf{V}^H)_{ii}\}$, such that the maximum power from

- any of the N plurality of antennas is P_{\max}/N and the total power emitted from the N plurality of antennas combined is between P_{\max}/M and P_{\max} .
9. (currently amended) The method of claim 7, wherein the [[step of]] processing comprises multiplying the vector \mathbf{s} with the transmit matrix \mathbf{A} , where $d = 1$, such that the power emitted by antenna i for $i = 1$ to N is $(P_{\max}/N) \cdot (\mathbf{V}\mathbf{V}^H)_{ii}$, and the total power emitted from the N plurality of antennas combined is P_{\max}/M .
10. (currently amended) The method of claim 1, and further comprising:
 ~~the steps at the second device of~~ receiving at the M plurality of antennas signals transmitted by the first device; and
 processing the signals received at each of the plurality of M antennas with receive weights and combining the resulting signals to recover the L signals.
11. (currently amended) The method of claim 1, wherein each of the L signals is baseband modulated using a multi-carrier modulation process, and wherein the ~~step of~~ processing comprises multiplying the vector \mathbf{s} with a transmit matrix $\mathbf{A}(k)$ at each of a plurality of sub-carriers k .
12. (currently amended) A radio communication device, comprising:
a. N plurality of antennas;
b. N plurality of radio transmitters each coupled to a corresponding one of the plurality of antennas; and
c. a baseband signal processor coupled to the N plurality of radio transmitters to process a vector \mathbf{s} representing L signals $[s_1 \dots s_L]$ with a transmit matrix \mathbf{A} that is computed to maximize capacity of the

channel between the first device and the second device subject to a power constraint that the power emitted by each of the N plurality of antennas is less than or equal to a maximum power, ~~whereby the transmit matrix \mathbf{A} distributes~~ and that weights the L signals $[s_1 \dots s_L]$ for simultaneous transmission along the eigenvectors of the channel between the N plurality of antennas and a plurality of antennas of to the second device ~~by the N plurality of antennas.~~

13. (original) The device of claim 12, wherein the baseband signal processor processes the vector \mathbf{s} with a transmit matrix \mathbf{A} that is computed subject to the power constraint being different for one or more of the N plurality of antennas.
14. (original) The device of claim 12, wherein the baseband signal processor processes the vector \mathbf{s} with a transmit matrix \mathbf{A} that is computed subject to the power constraint being the same for each of the N plurality of antennas.
15. (original) The device of claim 14, wherein the baseband signal processor processes the vector \mathbf{s} with a transmit matrix \mathbf{A} that is computed subject to the power constraint for each of the N plurality of antennas being equal to a total maximum power emitted by all of the N plurality of antennas combined divided by N.
16. (original) The device of claim 15, wherein the baseband signal processor multiplies the vector \mathbf{s} with the transmit matrix \mathbf{A} , where the transmit matrix \mathbf{A} is equal to $\mathbf{V}\mathbf{D}$, where \mathbf{V} is the eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, \mathbf{H} is the channel response from the device to another device having M plurality

- of antennas, $\mathbf{D} = \text{diag}(d_1, \dots, d_L)$ and $|d_p|^2$ is the power of the p^{th} one of the L signals.
17. (original) The device of claim 16, wherein when $N \leq M$, the baseband signal processor multiplies the vector \mathbf{s} with the transmit matrix \mathbf{A} that is computed where $\mathbf{D} = \mathbf{I} \cdot \sqrt{P_{\max}/N}$, and \mathbf{I} is the identity matrix, such that the power transmitted by each of the N plurality of antennas is the same and equal to P_{\max}/N .
 18. (original) The device of claim 16, wherein when $N < M$, the baseband signal processor multiplies the vector \mathbf{s} with the transmit matrix \mathbf{A} that is computed where $\mathbf{D} = \sqrt{d \cdot P_{\max}/N_{\text{Tx}}} \cdot \mathbf{I}$ such that the power emitted by antenna i for $i = 1$ to N is $(d \cdot P_{\max}/N) \cdot (\mathbf{V}\mathbf{V}^H)_{ii}$, and $d_p = d$ for $p = 1$ to L .
 19. (original) The device of claim 18, wherein the baseband signal processor multiplies the vector \mathbf{s} with the transmit matrix \mathbf{A} that is computed where $d = 1/z$ and $z = \max_i \{(\mathbf{V}\mathbf{V}^H)_{ii}\}$ such that the maximum power from any antenna of the N plurality of antennas is P_{\max}/N and the total power emitted from the N plurality of antennas combined is between P_{\max}/M and P_{\max} .
 20. (original) The device of claim 18, wherein the baseband signal processor multiplies the vector \mathbf{s} with the transmit matrix \mathbf{A} that is computed where $d = 1$, such that the power emitted by antenna i for $i = 1$ to N is $(P_{\max}/N) \cdot (\mathbf{V}\mathbf{V}^H)_{ii}$, and the total power emitted from the N plurality of antennas combined is P_{\max}/M .

21. (original) The device of claim 12, wherein each of the L signals is baseband modulated using a multi-carrier modulation process, and the baseband signal processor multiplies the vector \mathbf{s} with a transmit matrix $\mathbf{A}(k)$ at each of a plurality of sub-carriers k .
22. (currently amended) A radio communication system comprising:
- a. a first device comprising:
 - i. N plurality of antennas;
 - ii. N plurality of radio transmitters each coupled to a corresponding one of the plurality of antennas; and
 - iii. a baseband signal processor coupled to the N plurality of radio transmitters to process a vector \mathbf{s} representing L signals $[s_1 \dots s_L]$ with a transmit matrix \mathbf{A} that is computed to maximize capacity of the channel between the first device and the second device subject to a power constraint that the power emitted by each of the N plurality of antennas is less than or equal to a maximum power, ~~whereby the transmit matrix \mathbf{A} distributes~~ and that weights the L signals $[s_1 \dots s_L]$ for simultaneous transmission along the eigenvectors of the channel between to ~~the second device by the N plurality of antennas~~ and a plurality of antennas of a second device;
 - b. a the second device comprising:
 - i. M plurality of antennas;
 - ii. M plurality of radio receivers each coupled to a corresponding one of the plurality of antennas; and
 - iii. a baseband signal processor coupled to the N plurality of radio receivers to process signals output by the plurality of radio

receivers with receive weights and combining the resulting signals to recover the L signals $[s_1 \dots s_L]$.

23. (original) The system of claim 22, wherein the baseband signal processor of the first device processes the vector \mathbf{s} with the transmit matrix \mathbf{A} that is computed subject to the power constraint being different for one or more of the N antennas.
24. (original) The system of claim 23, wherein the baseband signal processor of the first device processes the vector \mathbf{s} with the transmit matrix \mathbf{A} that is computed subject to the power constraint being the same for each of the N plurality of antennas.
25. (original) The system of claim 24, wherein the baseband signal processor of the first device processes the vector \mathbf{s} with the transmit matrix \mathbf{A} that is computed subject to the power constraint for each of the N antennas being equal to a total maximum power emitted by all of the N antennas combined divided by N.
26. (original) The system of claim 25, wherein the baseband signal processor of the first device multiplies the vector \mathbf{s} with the transmit matrix \mathbf{A} , wherein the transmit matrix \mathbf{A} is equal to \mathbf{VD} , where \mathbf{V} is the eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, \mathbf{H} is the channel response from the device to another device having M plurality of antennas, $\mathbf{D} = \text{diag}(d_1, \dots, d_L)$ and $|d_p|^2$ is the power of the p^{th} one of the L signals.